

**Collider Run II Shot Setup Documentation**

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Send suggestions and comments to [ad-pbar-tuning-adminNOSPAM@fnal.gov](mailto:ad-pbar-tuning-adminNOSPAM@fnal.gov) (remove "NOSPAM")**Sequencer:** Pbar**Collider Aggregate:** **Run II Finish Reverse Protons****Previous Aggregate:** [Run II Switch to Shot Lattice](#)**Purpose of this Aggregate:** This aggregate completes the beam line tune-up.**How to get back to stacking from here:** Finish this aggregate and then run both the [Run II Revert to Stack Lattice](#) and the [Run II](#)[Return to Stacking](#) aggregates.**... INSTRUCT 219 .**

Once on the Shot Lattice and with MI tune-up complete, this aggregate steps one through tuning up the P1, P2, AP1, and AP3 lines as well as injection into the Accumulator with reverse protons. Completing this tune-up gives high assurance that the Pbar transfer efficiency from the Accumulator to the Main Injector will be maximized.

Interrupt anywhere in this box to continue.

**... SHOT\_LOG COMMENT .**Enters the following comment into the Pbar portion of the shot scapbook at <http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=scrap03>.**● Time-** Finishing MI and Pbar reverse proton tune up. The Stack size is #####.#####. -  
**Sequencer****... WAIT\_DEVICE V:MSHOOT .**

Waits for state V:MSHOOT to arrive at a value of 4 (Reverse Proton Tuneup complete).

**... EVENT 9C DISABLE .**

Disabled the TCLK \$9C Accumulator sudden beam loss.

**... BEAM\_SWITCH Pbar\_Source Off .**

Turn off the Pbar beam switch

**... BOOST\_INTENSITY EVT16 1 .**

Sets Booster TCLK event \$16 to 1 turn 35 bunches.

**... CTLIT\_DEVICE D:BSC925 ON .**

Open the AP3 beam stop

**... CTLIT\_DEVICE D:ESEPV ON .****... CTLIT\_DEVICE A:ISEP1V ON .****... CTLIT\_DEVICE A:ISEP2V ON .****... CTLIT\_DEVICE A:IKIK ON D****... CTLIT\_DEVICE A:EKIK ON .****... CTLIT\_DEVICE A:EKIKQ ON D****... INSTRUCT 212 .**

It is now time to tune up the P1 to AP3 lines. The Sequencer sets the intensity to 1 turn, 35 bunches, opens the AP3 beam stop, and starts P150, the beam line tune up application. The page acts like a sequencer.

Strive to achieve an orbit with ~1.5 mm rms in both planes or 85% MI to Accumulator efficiency, whichever comes first.

If P1 BPM data looks unstable, please go to I39:

- Select the P1 LINE
- Check/set the Type: PROT

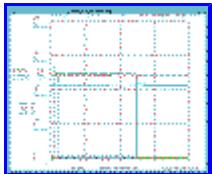
Should you wish to monitor devices while tuning and be able to easily restore them, call up P60/EXT/<37,38> to see Horizontal and Vertical devices, respectively.

Interrupt anywhere in this box to continue.

**``` AUTO\_PLOT Beamlne tuneup .**

Starts a FTP on the screen of the operator's choice to plots beam transfer efficiencies.

- Main Injector DCCT beam intensity readback I:IBEAMM from 0-0.32E12
- AP1 toroid beam intensity readback M:TOR105 from 0-32E10.
- AP3 toroid beam intensity readback M:TOR910 from 0-32E10.
- Accumulator DCCT beam intensity readback A:IBEAMB from stack size - stack size + 32 e10.
- All plotted over a time of 0-4 seconds triggered on an event \$93.



**``` START\_PGM P150 .**

Starts P150 Reverse Proton Tune-up for P1-AP3 application (keeper is Keith Gollwitzer).



**``` BEAM\_SWITCH Pbar\_Source On .**

Turn back on the Pbar switch to prepare to except beam.

**``` INSTRUCT 214 .**

Wait here until the beamline tuneup is complete. [CLICK HERE](#) before moving on to the TBT tuneup. The sequencer lowers the intensity to 1 turns, 7 bunches before the TBT tune up is started.

Updated! D:H926 is now adjusted from P150 via the device D:H926RP (reverse protons). At the end of this aggregate the current on the Pbar cycles, D:H926PB, is automatically set to match the final value of D:H926RP. elvin 9 mar 04

Interrupt anywhere in this box to continue.

**This is the P150 sequencer. The sequencer inside of the sequencer....**



Start the application and click on SEQUENCER in the menubar.  
This starts the P150 Sequencer.

```
::: Turn Beam Switch Off  
::: Check Booster  
::: Check A:IKIK ON  
::: Check D:BSC925 ON  
::: Check Shutters Closed  
::: Set BPM Trigger Settings  
::: Read BPM Reference File  
::: Clear Beam on Ext. Orbit  
::: Set Toroid FTP  
::: Turn Beam Switch ON  
::: Take BPM Data  
::: Turn Beam Switch OFF  
::: Set BPM Trigger Settings  
::: BPM Data OKAY?
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::: Save BPM Data in File  
::: Find Single Trim  
::: Correct Orbit  
::: |-> Turn Beam Switch ON  
::: | Take BPM Data  
::: | Turn Beam Switch OFF  
::: | BPM Data OKAY  
::: | Find Single Trim  
::: |-- Correct Orbit  
::: Start TBT Correction  
::: Check Booster  
::: Check Timeline  
::: Turn Beam Switch OFF  
::: Clear Beam on Ext. Orbit  
::: Setup Toroid FTP  
::: Turn Beam Switch ON  
::: |-> Take TBT Data  
::: |-- Correct Orbit  
::: Turn Beam Switch Off  
::: Turn off TBT system  
::: Finished
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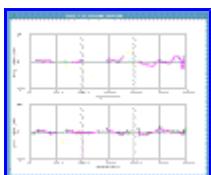
D

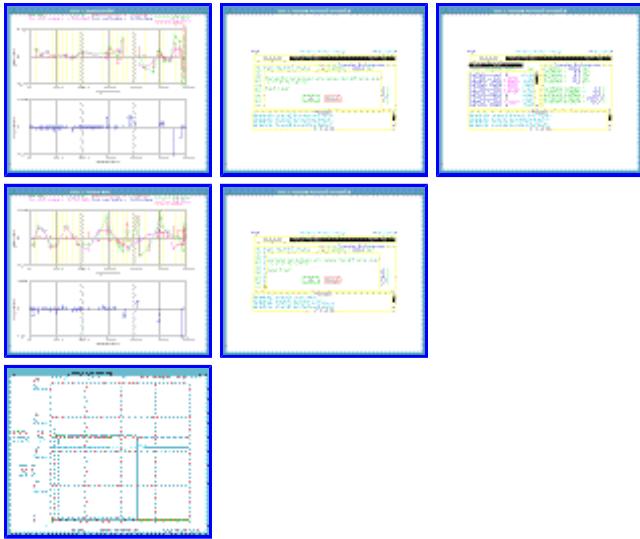
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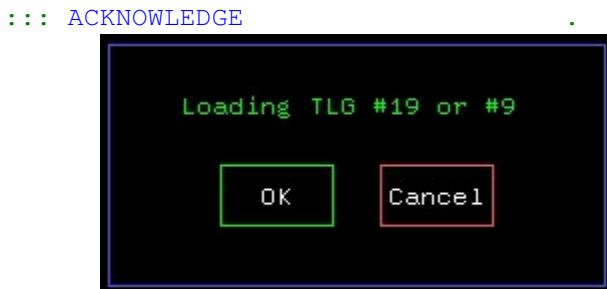
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```
::: SETIT_DEVICE V:PSHOOT =7 .
Sets the state V:PSHOOT to 7 (Pbar Beamline Tuneup Complete).
```

```
::: BOOST_INTENSITY EVT16 1 .
Set Booster beam event $16 to 1 turn 7 bunches.
```



```
::: LOAD_TLG 9 REPEAT .
Loads TLG 9 which is described in the instruct below.
```

```
::: WAIT_DEVICE G:TLGSEQ .
Wait for the timeline 19 to be loaded.
```

```
::: INSTRUCT 216 .
```

The Accumulator TBT timeline has just been loaded. This is nominally TLG #19. **For Mixed Pbars, #9 is used.**  
 This timeline contains only one reverse proton cycle preceded by an \$80 and also contains a \$2B and a \$2A for either Tevatron reverse injection or MI tune up. **For Mixed Pbars, check that the \$2E ramp is correct if this has not been checked already.**  
 P162 is about to be started to minimize Accumulator Turn-by-Turn oscillations. Strive to achieve data points within the innermost circle of the bulls-eye plot.

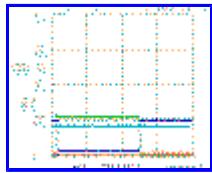
Interrupt anywhere in this box to continue.

```
::: AUTO_PLOT TBT eff .
```

Starts a FTP on the screen of the operator's choice to plots beam transfer efficiencies.

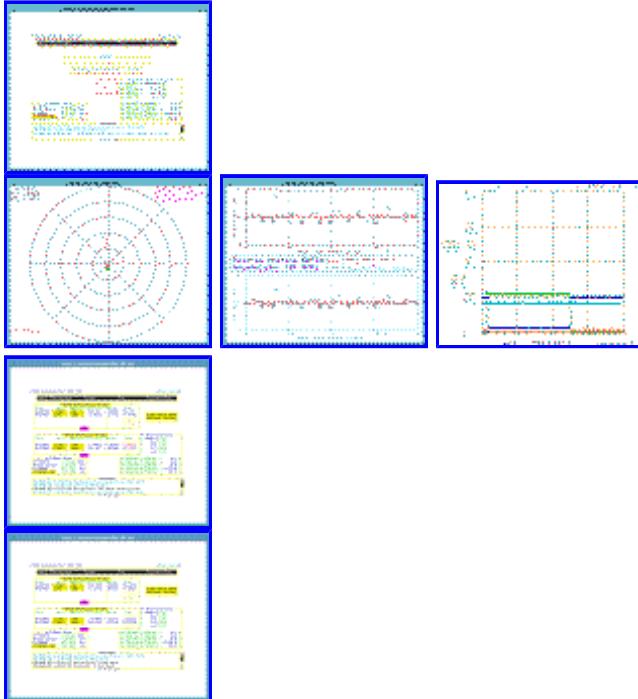
- Main Injector DCCT beam intensity readback I:IBEAMS from 0-15E10
- AP1 toroid beam intensity readback M:TOR105 from 0-15E10.
- AP3 toroid beam intensity readback M:TOR910 from 0-15E10.
- Accumulator DCCT beam intensity readback A:IBEAMB from stack size - stack size + 15 e10.

- All plotted over a time of 0-3.2 seconds triggered on an event \$93.



::: START\_PGM P162 .

Starts P162 Accumulator BPM TBT and oscillation minimization (Gollwitz) .



::: INSTRUCT 215 .

Once TBT tuning is complete, continue in the Sequencer to automatically save the TBT plots. DO NOT terminate P162 until after the plots are saved.

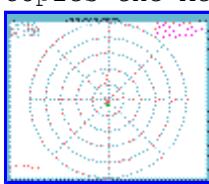
Interrupt anywhere in this box to continue.

::: ACKNOWLEDGE .



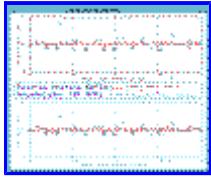
::: COPY\_SCREEN LCL MY SLOT .

Copies the Accumulator TBT polar plot to save file.



::: COPY\_SCREEN LCL MY SLOT .

Copies the Accumulator TBT difference orbit to save file.



::: SHOT\_LOG IMAGE .

Copies the above two TBT images to Pbar portion of the shot scrapbook at  
<http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=scrap03>

::: INSTRUCT 217 .

In the next command you will be prompted to save the reverse proton FTP away to the Shot Scrapbook. Please select the console and window.

Note: you must explicitly select the console to copy the image from!

Interrupt anywhere in this box to continue.

::: SHOT\_LOG IMAGE .

Copies the above two TBT images to Pbar portion of the shot scrapbook at  
<http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=scrap03>

::: BEAM\_SWITCH Pbar\_Source Off .

Turn off the Pbar beam switch.

::: CHECK\_DEVICE A:CENFRQ READING .

Checks the value of the Accumulator center revolution frequency parameter and prints the value in the message box on the sequencer.

::: CHECK\_DEVICE A:VFACCM READING .

Checks the value of the Main Injector to Accumulator frequency parameter and prints the value in the message box on the sequencer.

::: CTLIT\_DEVICE A:DPLHPI OFF D

Turn off the Accumulator horizontal damper.

::: CTLIT\_DEVICE A:DPVLPI OFF D

Turn off the Accumulator vertical damper.

::: CTLIT\_DEVICE A:EKIK ON .

::: CTLIT\_DEVICE A:EKIKQ ON D

::: ACKNOWLEDGE .



::: CTLIT\_DEVICE A:EKIK OFF .

::: CTLIT\_DEVICE A:EKIKQ OFF D

::: CTLIT\_DEVICE A:IKIK OFF .

::: CTLIT\_DEVICE A:ISEP1V OFF .

::: CTLIT\_DEVICE A:ISEP2V OFF .

::: CTLIT\_DEVICE D:EKIK OFF .

::: CTLIT\_DEVICE D:EKIKQ OFF D

::: CTLIT\_DEVICE D:ESEPV OFF .

STOP! You have reached the point of No Return. Reverse Proton tuning is complete. Verify that all other machines are ready to proceed with the final steps in shot set up before continuing. Beyond this point, the Pbar source can not be easily oriented for reverse protons and is pretty much committed to unstacking.

Interrupt anywhere in this box to continue.

```
...: CHECK_DEVICE A:SCRES RESTORE .
...: CHECK_DEVICE D:EKIKM1 RESTORE .
...: CHECK_DEVICE D:EKIKM2 RESTORE .
...: CHECK_DEVICE D:EKIKM3 RESTORE .
...: CHECK_DEVICE A:ISEP1V RESTORE .
...: CHECK_DEVICE A:ISEP2V RESTORE .
ok SET_DEVICE D:H926PB D:H926RP .
```

**Collider Aggregate:** Run II Finish Reverse Protons has been completed.

**Next Aggregate:** Run II Continue Shot Setup

**How to get back to stacking form here:** Finish this aggregate and then run both the [Run II Revert to Stack Lattice](#) and the [Run II Return to Stacking](#) aggregates.